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ABSTRACT

The study reported in this paper examined a group of science teachers' beliefs about the implementation of controversial social/technical issues in the extant science curriculum. Beliefs were measured by a 44-item Likert type instrument. Teachers were asked to elucidate their ideas relating to the teaching of social issues in areas such as support for teaching controversial social/technological issues, sources of information on controversial social/technological issues, and specific issues they believe are of importance to include in the extant curriculum. Several aspects of teachers' beliefs about curriculum and textbook usage, personal beliefs about controversial issues, specific social issues and their importance, outside influences, and teacher-student relations were investigated. Results indicate that teachers feel that controversial topics are important to study, yet lack the support from communities to implement such controversial topics. Contains 47 references. (Author/JRH)

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Beliefs Of Science Teachers Towards The Implementation Of Controversial Social/Technological Issues As Part Of The Extant Curriculum

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Abstract

We, as science educators, must view the changing nature of society brought on by technology and the global nature of society as an impetus to re-examine the nature of our science instruction. We have been bestowed with the responsibility to educate students on a variety of topics that, less than two decades ago, did not exist. Many of these topics are controversial in nature and are directly linked to the global community in which we exist. However, including these controversial issues in the extant curriculum of science has, at best, been limited. The current study examines a group of science teachers' beliefs about the implementation of controversial social/technological issues in the extant science curriculum. Beliefs were measured by a 44-item Likert type instrument designed by the authors. Indications are that teachers feel controversial topics are important to study, yet lack the support from communities to implement such controversial topics.

INTRODUCTION

Controversial social/technological issues are at the forefront of daily life. One only has to look over the past few years and examine periodicals to see the impact that science and technology have on our society (i.e., the Oklahoma bombing, genocide in Iraq using biological weapons, deforestation across the globe). Reform efforts such as Project 2061: Science for All Americans (1989), is encouraging science teachers to weave within the fabric of their curriculum the social and technological impact of the science that they teach. Yet, indications are that little is being done in the classrooms to engage and immerse students in the rigorous understanding of the complexity of these interactions (Pedersen and Totten, 1994). This study sets out to examine the beliefs of science teachers concerning the implementation of controversial social/technological issues in the extant science curriculum. The significance of this study centers on the value of understanding teachers beliefs and utilizing these beliefs in assisting in our current reform efforts.

Social Issues As A Context For Science

The nature of society in which we live is changing. No one would argue this point after examining the changes in society over the past few decades. Current societal norms are exposing our children to countless social issues that did not exist even ten years ago. Although not all of these social issues are linked to science and technology, many are. Schools today, and especially science curricula, have an obligation to immerse students in the rigorous understanding of the interrelationship of science/technology/society to assist in understanding these social issues. Many science educators (Yager, 1992; Pedersen, 1992; Roy, 1989; Rubba & Wiesenmeyer, 1985) propose that science/technology/society issues are an appropriate avenue by which controversial social/technological issues should be incorporated into the classroom. For example, Hofstein and Yager (1982) advocate a science classroom where the content would be selected on its value in assisting students deal with real world problems.

The study of these complex issues faced by society, which there may or may not be a consensus as to the cause and/or solution to the problems; and may in fact be controversial (Totten, 1992) are supported by many current reform efforts such as Project 2061: Science for All Americans, (1989). As Simmons (1993) comments, "The teaching of science/technology/society (STS) topics to students is advocated by members of the science education community as a critically needed infusion for the reform of science teaching and curriculum." (p. 1) In fact, as Bragaw (1993) indicates, all of the present or proposed science education improvement projects

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have a social and behavioral component to them and some profess a science-technology-society orientation for at least part of the design. Yet, Fensham (1986) states that our current school science is no less than a vocational preparation for those heading into science careers. Fensham argues that "aspects of science that students will very likely use in a relatively short time in their daily lives outside of school; and, aspects of natural phenomena that exemplify easily and well to the students the excitement, novelty, and power of scientific knowledge and explanation" (p. 22) should be key aspects of science curricula. It is through such proposals that we begin to provide a context for the development of a scientifically literate individual.

Scientific literacy has emerged as a central role of science education, which includes science/technology/societal (STS) themes as a part of the definition. As aptly pointed out by Project 2061: Science for All Americans (1989), a scientifically literate person is one who is aware of the strengths, limitations, and interdependency of science, mathematics, and technology; understands the principal scientific concepts of science; is familiar with the natural world and understands both its unity and diversity; and is able to use scientific knowledge and scientific ways of thinking to advance social and individual purposes. Not only should students study the countless ways scientific and technological developments have enhanced our lives, but they should learn, as well, about the tangle of interconnected consequences that spin off such developments. Only then will they truly comprehend the symbiotic and dynamic relationship among science, technology, and society (Gilliom, Helgeson, Zuga, 1992). However, research completed over the past decade reflects the ignorance of the general population towards an understanding of science. Morris Shamos states, (in Rachlin, 1988) that as much as 95% of society is ignorant about science. Public surveys measuring scientific literacy also indicate a dearth of understanding by individuals when it comes to basic science concepts. This evidence is clearly supported in regard to public school children by the extensive analysis of 9, 13 and 17 year olds lack of knowledge or understanding of scientific concepts (Mullis and Jenkins, 1988). A focus must be resolved for science education that relates the study of scientific principles to the personal lives of the students and the society in which they live. It may no longer be possible to draw a clear line between the intellectual demands of good science and the ethical demands of the good life (Toulmin, 1979).

In addition to the building of a scientifically literate citizen, various researchers have found that the study of STS, or using social and technological issues as the context of the study of school science impacts the attitudes and achievement of students. Learning science in an STS context enhances creativity, improves attitudes, increases academic achievement, and expands the use of science in daily life (Bybee, 1987; Bybee & Mau, 1986; Penick & Yager, 1986a; Yager, 1988). For example, Aikenhead (1990) indicates that the concrete connections between the academic science content and the student's everyday world make the academic science content more interesting to learn for 80% of the students. Other researchers indicate that social issues such as nuclear energy, population growth, and environmental stresses encourage interest, critical and high-level thinking, as well as problem-solving and decision making capacity for a democratic system in students (Zoller, Donn, Wild, & Beckett, 1991).

Teacher Beliefs

Even with the perceived and documented advantages of the implementation of controversial issues, there seems to be a "taboo" or stigma tied to the teaching of these topics in science classrooms. As McGinnis (1993) reports, "Some controversial topics are perceived by some teachers to be taboo in their local cultures and are not taught." (p. 21) Even though there is a "movement" afoot nationally, and teachers indicate that STS themes should be a part of the school science program (Bybee, 1993), teachers, administrators, parents, teacher educators and other stakeholders continue to debate whether social issues should be included within the extant science curricula. Others indicate that the study of controversial social/technological issues focus mostly on the social studies (Mitchner & Anderson, 1989). Still others, (McGinnis, 1993) indicate that some of these issues are too controversial to teach in the local culture (Jackson, 1993). It seems that it would be critical to consider

the venue or context in which social issues are selected. That is to say, local culture could play a key role in what is controversial or not. In this study, culture is defined as anything learned within a social group.

In a study conducted in the mid 80's, teachers were surveyed as to their knowledge and perceptions of STS as it pertains to the study of school science (Bybee and Bonnstetter, 1985). Of particular interest from that study was that science teachers indicated that: schools include less instruction on STS issues than the amount the teachers recommend; some courses in which STS is a primary focus should be required of all students; science and social studies aspects of STS issues should be integrated and taught in one course. The results of Bybee's and Bonnstetter's study are surprising considering that teachers reveal that they have a hesitation to take on the STS theme. This may assist in explaining why students report that the sciences and technology are not closely related to social problems (Aikenhead, 1988). In addition, Aikenhead (1988) indicates that 73% of students surveyed indicated that the main sources of their ideas about scientists and the social and technological contexts of science were television, films, magazines, and books. Science classes as a source of ideas only ranked a distant 10% and only two percentage points above both family members and English or social studies classes. In a similar type study, Pedersen and Totten (1994) found that the sciences (biology, chemistry, physics and earth sciences) as the place least likely for them to study social issues.

Many students have developed false conceptions and beliefs about science, scientists, technology, engineers, and research and development in these fields (Aikenhead, 1985a; 1989b; Ryan, 1987). In addition, Lawson and Worsnop, investigating the effects of culture/science conflicts, found that certain cultural beliefs (in this case, special creation) hindered the acquisition of science beliefs (1992). They found, in essence, that beliefs, rather than declarative knowledge, were related to the acquisition of scientific beliefs. It would appear that findings such as these as well as other research on culture and acquisition of scientific beliefs and knowledge (Allen, 1996) would indicate that when cultural beliefs conflict in the science classroom, learning may be impeded.

Beliefs are defined in this study as statements considered to be true or false, regardless of whether they are or not, which define expectations as explicit or implicit cognitive predictions with varying degrees of strength and certainty. (Brophy and Evertson, 1981). As related by the previous research, teachers seem to say that they believe in the value and worth of STS as a context for the study of science, but, their activities and practice do not match these stated beliefs.

It is recognized that teachers beliefs do influence the way the curriculum is interpreted and implemented (Mitchner and Anderson, 1987; Zoller, Dunn, Wild, and Beckett, 1991). In relation to this view, Benson (1989) states that the gap between what teachers say they believe about the nature of science and what they do in practice is apparent. When confronted with the apparent contradictions between their beliefs and practice, teachers cite external constraints as a major factor influencing their practice. This could be similarly related to the view that the teachers hold of STS. That is to say, although teachers hold particular beliefs about the role of STS, external constraints may be viewed by the teachers as preventing them from implementing their beliefs. As Jackson (1993) states, STS themes may be perceived to be to controversial in the local culture by the teachers. Hence, a contradiction occurs between the teachers beliefs and the belief system of the culture of the school and community.

In relation to this, teachers entering a school are immersed in a culture that is unique to the school itself. These new teachers enter into the community (i.e., the school) where canonical knowledge (commonly shared and accepted knowledge) from the more experienced and "competent teachers" (McGinn, et. al, 1995) may reaffirm or contradict their own beliefs. As Bruner (1985) indicates, "members of a culture learn from their tutors, the vicars of their culture, how to understand the world...that consists of conceptually organized, rule bound beliefs systems about what exists, about how to get to goals, about what is to be valued." (p. 32). Therefore, teachers beliefs may be impacted by the culture milieu of the

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current community through canonical knowledge shared amongst peers. In essence, the communities constraints may indeed impact the beliefs of the teacher. Tobin (1994) concurs that constraints can be obstacles to change in teachers practices. When constraints act as myths for a culture (i.e., time, scarce resources, control, social expectations), they [teachers] may suppress any changes considered, even when teachers are strongly committed to personal change (Tobin, 1991; Tobin et al., 1992). With this in mind, we must heed the caution of O'Loughlin (1990) who states that "teacher beliefs should not be conceptualized as simple cohesive systems which have a direct causal bearing on teachers' actions."

Science educators have focused on STS implementation throughout the 80's and 90's (Aikenhead, 1992; Ellis, Bybee, Giese, & Parisi, 1992). However, it is not evident how the implementation into the extant curriculum will happen (Tobin, 1994). As Tobin (1994) aptly states, "Future research should seek to enhance our understanding of the relationships between teacher beliefs and science education reform. Many of the reform efforts of the past have ignored the role of teacher beliefs in sustaining the status quo.

Objective/Purpose of the study

The objective of the study was to examine teachers' beliefs and perceptions about the implementation of controversial social/technological issues in the extant curriculum. Teachers were asked to elucidate their ideas relating to the teaching of social issues in areas such as: support for teaching controversial social/technological issues; sources of information on controversial social/technological issues; and, specific controversial social/technological issues they believe are of importance to include in the extant curriculum.

The purpose of the study was to examine science teachers' beliefs about implementing controversial social/technological issues into the extant science curriculum. Several aspects of teachers beliefs about: curriculum and textbook usage; personal beliefs about controversial social/technological issues; specific social issues and their importance; outside influences; and, teacher/student relations, were investigated.

Subjects

Thirty-seven (37) science teachers particpated in the study representing rural, urban and suburban areas who attended a summer or spring workshop on improvement of science teaching at a major southeastern land grant institution. All participants were selected from the workshops. It should be noted that the workshops did not place an emphasis on the usage of controversial social/technological issues.

Design and Procedures

The instrument used for this study was a 44--item Attitudes and Beliefs survey that had seven subsections (demographic data, curriculum and textbooks, personal beliefs, outside influences, teacher/student relationships, support for the implementation of social/technological issues, and specific social issues). The first section asked respondents to indicate general demographic information. The next five subsections were Likert type scales asking the participants to indicate their particular beliefs. The final subsection asked the respondents to rank order the importance of specific social issues. The survey was developed by the principal investigator. A panel of experts was utilized to examine the instrument. During this process, 11 items from the original survey were viewed by the panel of experts as ambiguous and/or redundant. Based on these recommendations, all 11 items were cut from the original instrument. After making those corrections, the instrument was used in its present state of 44 items.

The instrument was given to all 37 participants of the two separate workshops. Individuals were selected for the workshops based on an application process which selected science teachers who had an interest in improving their science teaching strategies. Of those attending and receiving the instrument, 32 were returned in a completed form.

After a period of approximately one month, 50% of the respondents were sent the same 44 item survey and asked to complete it again. These surveys were used in a comparison

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with the original data set as means to calculate reliability. The test/re-test method employed, using correlation coefficients, indicated that the instrument had an "r" value of .85 (r=.85). Based on this information, it was determined that the instrument was reliable.

Results

The respondents to the survey were a group of teachers who participated in a voluntary workshop on the improvement of their teaching and understanding of science. The majority of the respondents to the current project were a very homogeneous group. They were all about the same age, same race, and approximately of the same level of education (table 1).

For the analysis and reporting of the results, the 40 items contained in section two of the Attitudes and Beliefs Survey were divided into five broad categories: Curriculum and Textbooks, Personal Beliefs, Beliefs About Social Issues, Outside Influences/Constraints, Teacher/Student Relationships, Importance of Social Issues, and Sources of Social Issues. These categories represent several aspects of the teaching of social issues. Therefore, it is necessary to look at the data from each of these categories separately in a careful manner in order to gain a complete understanding of the attitudes and beliefs of the respondents in this pilot study.

Curriculum and Textbooks

The items in this category attempted to gain insights into the curriculum that is currently being used in the classroom. More specifically, the goal was to obtain insights as to the teachers development of their curriculum as well as ascertaining whether or not social issues were included in the curriculum. The results from this section were surprising and represent the antitheses of what the investigators of this pilot study anticipated. It would appear that the majority of respondents have a belief that including social issues in their curriculum is important. Over 70% of the respondents strongly agreed or agreed that social issues should be integrated into the curriculum. Data from this category also showed that the respondents have the freedom to develop their own curriculum with little or no outside influence. But despite this freedom, more than 68% reported their curriculum was derived from a textbook. This factor becomes even more surprising coupled with the fact that over 81% of the respondents stated that textbooks do not adequately cover social issues and that 87% believe that they integrate current world affairs. This is an apparent contradiction to previous statements in which the respondents believed that social issues should be included in science classrooms. In addition, the respondents were split evenly on whether or not their lesson plans incorporated social issues that their students were interested in. (table 2).

Another apparent contradiction that becomes evident from the data is that over 56% of the respondents stated that they incorporate social issues into their curriculum. The question that arises form this belief that teachers hold is how? How are social issues incorporated in the extant curriculum if nearly 69% of the teachers report that their curriculum is based on a textbook that does not adequately cover social issues and is not presenting information that students are interested in learning about?

Personal Beliefs

The majority of the respondents indicate that they have a belief that teaching social issues is important. Well over 80% stated they would feel comfortable discussing social issues in the classroom. They also stated they could effectively teach social issues, are competent to teach social issues, and are adequately prepared to teach social issues (table 3). Also, over 55% believed that teaching social issues is just as important as teaching math, science, social studies, etc. But it is important to note that fewer than 13% of the respondents believed that teaching social issues is not as important as teaching the content related to specific disciplines and over 30% had no opinion.

Data from this category also suggests that over 68% of the respondents from this pilot study believe that teachers bear too much responsibility in educating students on social issues. This point may be related to why some teachers do not believe that social issues should be taught in the classroom. They believe that it is not their job to educate students about social issues, but to educate students about the content of their

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discipline. The respondents also indicated that teaching social issues in their classroom would create controversy in their school. This may also be a key reason why many teachers do not incorporate social issues into the extant curriculum because they believe negative reactions will follow from outside influences.

Specific Social Issues

The majority of the responses in this category indicated that teachers hold beliefs that teaching these specific social issues are important. Surprisingly, the respondents provided very positive opinions about the teaching of social issues that are controversial in nature such as environmental studies, HIV/AIDS, censorship, and abortion rights. This data is consistent with previous data reported in the preceding sections. More specifically, the respondents have consistently indicated a belief that teaching social issues is important. Furthermore, it indicates that these teachers hold a belief that is "open-minded" in regards to the topics represented as social issues (table 4).

Outside Influences/Constraints

In this section, items focused on the outside influences and/or constraints that are a part of teaching, namely: administrators, peers, community, etc. The goal of the investigators was to examine whether the teachers held a belief that these outside influences were constraints to the implementation of social issues in the extant science curriculum. Over 74% of the teachers reported that they have their principal's support for trying new ideas in the classroom. At the same time, 75% of the respondents believed that they are appreciated and respected by their administration. Despite these positive beliefs, this section of the survey also indicated some very disheartening information.

Only about 18% of the teachers believed that their co-workers provide them with support when it comes to teaching social issues. In addition, nearly 44% of the respondents had no opinion on whether they received support from their co-workers. This important factor may be still another reason why some teachers are apprehensive when considering integrating social issues into their curriculum.

Another alarming factor is that the responses for the questions, "I feel that I would be supported by the parents of my students on teaching social issues in my classroom." were very mixed. Less than 50% of the teachers believed they had the parents support for the inclusion of social issues. (table 5). In addition, the data in this section also provided information on the preservice and inservice programs these teacher participated in. The data indicated that the teachers held a belief that their preservice and inservice programs did not adequately prepare them for the teaching of social issues.

Teacher-Student Relationship

Obviously, it is important for teachers and students to be able to communicate with one another. It is through this communication that teachers can enhance the educational process. The majority of the respondents reported having a positive relationship with their students. They believe that their students want to learn about social issues, and teacher and students feel comfortable communicating about these social issues with one another. All of the respondents indicated that they have a positive impact on their student's lives. All of the respondents in this category indicated that they have an obligation to teach students how to become responsible citizens.

Other Issues

The last three sections of the survey provided information on the specific social issues teachers felt should receive the most to the least amount of attention in school. It should be noted that there was not a way that we could include all social issues in our list. With that in mind, we attempted to include social issues that were relevant, broad and current. Section four of the survey examined the teacher's sources of information on social issues. Again, as in the previous section, we could not include all types of possible sources. Therefore the results are based on those sources we pre-selected. The last section looked at the level of support that the teachers received from administrators, faculty/staff, peers, student's parents, and

the community at large which helps in corroberating previous questions responded to in section two of this survey.

The teachers rated such issues as sex education, substance abuse, and the environment high on the list of social issues they felt were the most important to be taught. The teachers also indicated that they receive the majority of their information about social issues from newspapers, television, and radio. As far as support from administrators, faculty/staff, peers, etc., teachers related that they received a moderate level of support from these individuals. However, it is interesting to note that nearly 60% of the teachers indicated that they receive low support for the teaching of social issues by their community (tables 7, 8, and 9).

Discussion

We believe that in coming to understand the teacher and the teachers actions is critical in the cycle of reform. Without knowledge of how one implements and acts on new ideas, the new ideas themselves become meaningless if they are acted on in a trite manner. We have all seen over the years those "reform efforts come and go." We ask ourselves, why? If we are doing our best to research and understand how children come to know and understand science, and how teachers teach, then what is missing? Why is it that we keep getting what we have always got, in terms of the implementation of reform efforts and classroom practice. As an example, social issues or STS as a reform has been supported and been part of most modern day reforms (Bragaw, 1993). Yet as Totten and Pedersen (1994) show, students report little knowledge and involvement in the actual study of social issues.

This pilot study comes from the basis of this dilemma. The authors make an attempt at initiating the first steps in a long search into teachers beliefs and the possible constraints associated with their beliefs when it comes to the implementation of social issues. Even though the majority of the respondents indicated a belief in the teaching of social issues (over 50% stated they would feel comfortable discussing social issues; and, most indicated that they could effectively teach social issues, are competent to teach social issues, and are adequately prepared to teach social issues) only 37.50% believed that teaching social issues is just as important as teaching the "content." Although "content" can be interpreted in different ways, it would seem that the respondents are sharing important information about their beliefs in relation to the curriculum of their classrooms.

Recall, that the teachers also indicated that the textbook played a key role in the development of their curriculum. This is not surprising since research has shown that textbooks are often used as the primary source of information in the science classroom (Harms & Yager, 1981; Stake & Easley, 1978; Yore & Denning, 1989). Yager (1983) has documented the textbook dependence of science instruction, reporting that more than 90% of all American science teachers use a textbook 95% of the time and that generally the curriculum is guided by a single textbook. However, teachers also believed that they had the freedom to develop their own curriculum with little or no outside influence.

All of this becomes more than a little disturbing considering an overwhelming number of the respondents believed their textbooks do not adequately cover social issues. This could lead one to the idea that teachers see a textbook as a source of content and not a source for social issues. Further data supports a conflict in the teachers beliefs and their reported actions. Most notably is that over 70% of the respondents strongly agreed or agreed that social issues should be integrated into the curriculum and 56.25% of the teachers indicated that they incorporate social issues into their curriculum. This alone seems ironic since 68.75% indicate that they use the textbook that does not adequately incorporate the study of social issues. Why is it that teachers report a belief in social issues as an important part of the extant curriculum, yet verify that the sources of curricular materials that they use do little to enhance the development of curriculum that incorporates social issues, even though they have the freedom to do so? Although, this alone does not verify that social issues are not being taught, it does point out one area where a conflict or a possible constraint might exist in limiting the implementation of the STS reform. Namely, the reliance on a textbook as the source of their curriculum and the belief that content is the most important context in a science classroom.

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In addition to the reliance on the textbook as the sole source for the curriculum, it is also interesting to note where teachers report they get information about social issues. As Aikenhead (1988) shares, 73% of the students get their information about scientists and the social technological contexts of science from television, films, magazines, and books. Is it a wonder, since at least in this study, teachers indicated that newspapers, television, radio and personal experience were the places where they were most likely to receive information about social issues. Although these sources of information are most likely linked to the relative "ease" in which they could be accessed, it was a little disheartening to see that lectures/inservice/conventions ranked in the bottom half of their sources of information. And, in fact, friends/acquaintances and family have approximately the same mean ranking as lectures/inservice/conventions.

In addition to beginning to understand the relationship in regards to teacher beliefs on content and textbooks, more disturbing is the beliefs shared by teachers on their role in educating students about social issues. As noted previously, teachers indicate a belief that teaching social issues is important and that they indeed include social issues in their extant curriculum. However, teachers also indicate that they believe teachers bear too much responsibility in educating students about social issues. This is very surprising since in this same survey nearly all of the teachers surveyed claim a belief that preparing or educating students to be productive citizens is a goal of education. There is, from the data, a clear picture that teachers beliefs and actions are not in sink. That is to say, the teachers report that they believe in social issues yet repeatedly indicate that there is a lack of social issues as part of their own school curriculum.

An example is, teachers believe that they are competent to teach social issues, that they are adequately prepared to teach social issues, and have no definite anxiety about teaching social issues. Yet, the majority of the teachers believe that teaching social issues would create controversy within the school system. Although this conflict or constraint come to the surface, it seems that there is much more here than just a fear of controversy. The teachers seem to have a belief in the value of teaching social issues and believe themselves able to do so but, do little to put this belief into practice.

It would seem that a key and critical piece of information in this puzzle would be the role of others (administrators, faculty/staff, student's parents, community members) in the support of teaching social issues. Most of the teachers felt that they had their principals' support for trying new ideas in their classroom. These teachers also believed that their peers would support such reform efforts as the teaching of controversial issues. Despite this support, over 30% of the respondents stated they are not supported by other faculty and staff members when it comes to teaching controversial issues. Only 31.25% of the respondents indicated that they would be supported by the parents of their students on teaching social issues in the classroom. It is clear from this data that the teachers responding to this survey felt that the community in which they teach would at best only provide moderate support for the study of social issues in their science classroom. And in fact, the majority of the teachers believe that they have either low support or no support for the study of controversial social/technological issues from their community.

This again is an additional piece to place in the puzzle as it concerns a teachers attempts to implement social issues into the extant science curriculum. If support is lacking, especially from those who are supporting you, then your actions may be limited in terms of your willingness to "go it alone." As the old axiom states, "When in Rome, do as the Romans" has significant meaning when one is placed in the culture of a school and community. In addition, the significance of canonical knowledge becomes more apparent when a teacher comes in contact with knowledge and beliefs that are accepted by the majority and then shared. Bruner's words are appropriate to reiterate here that we learn from the members of our culture how to understand the world and what is valued (1985). It seems that the teachers in this study may have contradictions in their own beliefs about the teaching of social issues and those offered by the culture of the community and school.

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Teachers indicated that they believed that they had good relationships with their students, believed that their students wanted to learn about social issues, and were comfortable communicating with their students about social issues. All 32 of the respondents indicated that they had a positive impact on their students. Again, it is interesting to these researchers that the teachers hold a belief that they are responsible for teaching their students to become responsible citizens. As mentioned above, the same teachers indicated that they bear too much responsibility for educating students on social issues. Could it be that these respondents do not see the connections between the study of controversial social/technological issues and assisting students to become responsible and productive members of society? Or is it the fact that there are too many perceived constraints on the teachers to implement what they believe as important?

Finally, teachers in this study indicated that they believed their preservice education did not prepare them for teaching social issues. In addition, teachers believe that their schools inservice programs do not provide adequate information or skills necessary to teach social issues. Again, as with each piece of evidence shared in this study, this alone is not enough to generalize and state that "this is the reason" that social issues are not taught. However, this with other aspects shared from the study can provide us with insights as to why teachers may not be implementing or are struggling to implement social issues in the extant curriculum.

From the data collected in this study, teachers believe in themselves to be able to teach and implement controversial social/technological issues into the extant science curriculum. However, it would also appear that the beliefs of teachers may be in conflict with their actions in the classroom. As indicated by the respondents, some major reasons appear as to why teachers seem to be reluctant to discuss or teach about controversial issues.

- Teachers believe that they lack the outside support from parents and their community to do so.
- In some cases, teachers also lack the internal support of faculty and staff when attempting to implement controversial issues into their science curriculum.
- It would seem that possible cultural expectations of the community might influence the development of teachers curriculum even though teachers believe that they have the freedom in their classrooms to develop what they deem as necessary.
- Teachers are presenting information to students based on textbooks that are severely deficient in the area of social issues.
- Teachers in this study report that over 65% of them use the textbook as the sole guide for developing the curriculum.
- Since teachers believe that these textbooks are devoid of information pertaining to social issues it is not just a little curious that this practice continues.
- The selection of said textbooks and the overwhelming use of these could also be linked to the expectations of the norms of the community in which the teachers practice.
- Content is the focus of the classroom even though teachers feel that social issues should be included.
- There is a lack of inservice and preservice education supporting the understanding of social issues.
- Teachers rely on easily accessible sources for their information on social issues.

Clearly if science educators are serious about the implementation of STS type topics into the extant science curriculum, more needs to be done to understand the construction of taboos and norms in communities, schools and

classrooms. In relation to this, it would be important to examine the myths that a culture projects onto teachers and the inherent expectations that communities have for the performance of the curriculum in public schools. For, as Bandura (1986) indicates, "of the many cues that influence behavior, at any point in time, none is more common that the actions of others." (p. 206)

Recommendations

The data received from this pilot study was limited to the population surveyed. Therefore, it is necessary that further study be conducted on this topic in order to obtain a firm conclusion of the beliefs of teachers and how these beliefs might influence their implementation of social issues into the extant curriculum. Based on the data collected, the investigators involved in this study can provide the following recommendations:

1. Further investigation needs to occur on how and if teachers develop their own curriculum that incorporates social issues that students are interested in. In addition, researchers need to focus on teachers beliefs about providing students with not only a sound knowledge of reading, math, science, social studies, etc., but teaching the relevance and importance of social issues and how they are intertwined into almost every aspect of society.
2. There needs to be in-depth research on textbooks, they need to include social issues that are relevant, and teachers beliefs related to their use. Ultimately, textbooks could provide students with valuable information on social issues, and serve as a foundation or supplement to the curriculum in which teachers develop.
3. Researchers need to examine the role of the beliefs of faculty/staff, administrators, principals, student's parents, and community members as it pertains to teachers development and implementation of curriculum. All parties involved in the educational process must learn to work together and support and respect each other in order to provide a quality education for all students.
4. Science educators must examine communities active role in the educational process. Research should focus on communities support and interaction and how this impacts curricula and instruction.
5. Further investigation must take place concerning preservice and inservice programs. From this pilot study, it would appear that social issues are lacking as a part of preservice or inservice programs.
6. Parents, teachers, administrators, faculty/staff, community, etc., need to understand the changing face of society. The curriculum that was used ten years ago, and in some instances five years ago, does not meet the needs of all students. Students have definite opinions on the needs they have in the educational process. Parents, teachers, administrators, etc., need to listen to the students. Since students want to learn about social issues in school, educational leaders need to effectively and thoroughly implement social issues within the curriculum and instructional process.
7. More information needs to be collected on teachers that do integrate social issues into their curriculum and their beliefs as well as how these teachers ameliorate the possible constraints that exist among their beliefs and the culture of the school.
8. Future study needs to examine the role of canonical knowledge and its impact on teachers actions in the milieu of the school.

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Table 1

Demographic Data of Respondents

GENDER	NUMBER	PERCENTAGE
Male	14	43.75
Female	18	56.75
RACE	**NUMBER**	**PERCENTAGE**
African American	0	0.00
Asian	0	0.00
Caucasian	32	100.00
Hispanic	0	0.00
Native-American	0	0.00
Other	0	0.00
AGE	**NUMBER**	**PERCENTAGE**
21-30	2	5.25
31-40	14	43.75
41-50	12	37.5
51-60	4	12.5
Over 60	0	0.00
DEGREE	**NUMBER**	**PERCENTAGE**
B.A.	2	6.25
B.S.	14	43.75
M.S./M.Ed.	16	50.00
Ph.D./Ed.D.	0	0.00
YEARS TEACHING	**NUMBER**	**PERCENTAGE**
Preservice	2	6.25
Zero-Two	2	6.25
Three-Five	4	12.5
Six-Ten	4	12.5
Eleven-Fifteen	8	25.00
Sixteen-Twenty	10	31.25
Twentyone or More	2	6.25

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Table 2

Curriculum and Textbooks

Percentages Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
1	31.25	43.75	18.75	0.00	6.25
11	0.00	68.75	18.75	0.00	12.50
14	3.12	34.38	56.25	0.00	6.25
20	0.00	56.25	31.25	9.38	3.12
25	0.0	25.00	62.50	9.38	3.12
27	6.25	15.63	65.62	6.25	6.25
28	0.00	6.25	81.25	0.00	6.25
34	3.12	46.88	43.75	0.00	6.25
36	12.5	53.12	18.75	0.00	15.63
37	50.00	37.50	0.00	0.00	12.50

Responses Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
1	10	14	6	0	2
11	0	22	6	0	4
14	1	11	18	0	2
20	0	18	10	3	1
25	0	8	20	3	1
27	2	5	21	2	2
28	0	2	28	0	2
34	1	15	14	0	2
36	4	17	6	0	5
37	16	12	0	0	4

1. I believe that social issues should be integrated into the current science curriculum.
11. The majority of my curriculum is derived from a textbook.
14. The current science curriculum being taught in my school provides students with valuable information on social issues.
20. My current curriculum includes social issues.
25. I must follow a very strict curriculum set up by the district.
27. STS (science/technology/society) has been implemented in my present curriculum.
28. I feel that textbooks adequately cover social issues.
34. My lesson plans incorporate social issues that my students are interested in.
36. I consider the backgrounds and cultures of all my students when preparing lessons concerning social issues.
37. My curriculum integrates current world affairs.

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Table 3

Personal Beliefs

Percentages Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
2	31.25	56.25	12.5	0.00	0.00
4	12.5	56.25	21.88	0.00	15.62
5	31.25	56.25	12.5	0.00	6.25
6	18.75	50.00	25.00	0.00	6.25
9	75.00	25.00	0.00	0.00	0.00
10	3.12	59.38	34.38	0.00	3.12
17	18.75	37.50	12.5	0.00	31.25
21	31.25	37.50	18.75	0.00	12.50
24	0.00	25.00	62.50	6.25	6.25
26	6.25	50.00	28.12	0.00	15.63

Responses Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
2	10	18	4	0	0
4	6	18	7	0	5
5	10	18	4	0	2
6	6	16	8	0	2
9	24	8	0	0	0
10	1	19	11	0	1
17	6	12	4	0	10
21	10	12	6	0	4
24	0	8	20	2	2
26	2	16	9	0	5

2. I feel comfortable teaching and discussing social issues in the classroom.
4. I feel that I could effectively teach social issues.
5. I believe that social issues should be taught in schools.
6. I feel competent in my abilities to teach social issues.
9. I feel competent in the subject area(s) in which I am presently teaching.
10. I feel adequately prepared to teach social issues.
17. Teaching social issues is just as important as teaching math, science, social studies, etc.
21. I feel that teachers bear too much responsibility for educating students on social and ethical issues in schools today.
24. I have a definite anxiety towards discussing social issues with my students.
26. I feel that teaching social issues would create controversy within the school.

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Table 4

Beliefs About Social Issues

Percentages Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
7	15.65	46.85	37.50	0.00	0.00
15	62.50	37.50	0.00	0.00	0.00
19	53.15	46.85	0.00	0.00	0.00
22	31.25	62.50	6.25	0.00	0.00

Responses Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
7	5	15	12	0	0
15	20	12	0	0	0
19	17	15	0	0	0
22	10	20	2	0	0

7. Social issues such as abortion rights, censorship, land use, etc., should be taught in the classroom.
15. Courses such as environmental studies, current events, etc. should be taught in school systems today.
19. Global issues such as ozone depletion and land use should be discussed in the classroom.
22. I would feel comfortable discussing HIV/AIDS or other social issues with my class.

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Table 5

Outside Influences/Constraints

Percentages Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
12	9.38	78.12	0.00	0.00	12.50
16	6.25	12.50	31.25	9.38	40.62
18	0.00	37.50	31.25	0.00	31.25
23	18.75	56.25	12.50	0.00	12.50
30	6.25	37.50	31.25	0.00	25.00
31	6.25	62.50	12.50	0.00	18.75
32	0.00	18.75	56.25	15.63	9.38
33	6.25	18.75	40.62	15.63	18.75
35	0.00	12.50	56.25	21.87	9.38
38	6.25	62.50	18.75	0.00	12.50
39	12.50	62.50	25.00	0.00	0.00
40	3.12	90.63	0.00	0.00	6.25

Responses Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
12	3	25	0	0	4
16	2	4	10	2	13
18	0	12	10	0	10
23	6	18	4	0	4
30	2	12	10	0	8
31	2	20	4	0	6
32	0	6	18	5	3
33	2	6	13	5	6
35	0	4	18	7	3
38	2	20	6	0	4
39	4	20	8	0	0
40	1	29	0	0	2

12. I feel that I am appreciated and respected by my superiors.
16. I am thoroughly supported by faculty and staff members on teaching social issues.
18. I feel that I would be supported by the parents of my students on teaching social issues in my classroom.
23. I feel that I have my principal's support when trying new ideas in my classroom such as the teaching of social issues.
30. I feel that the parents of my students would support my efforts to teach about social issues.
31. My co-workers would provide me with support in regards to teaching about social issues.
32. My preservice program prepared me for teaching about social issues.
33. Inservice programs provided by my district or school provide me with valuable information and/or skills on social issues.
35. My principal has a lot of input into what I can teach in the classroom.
38. I involve the parents of my students in the educational process whenever possible.
39. I feel that parental approval of my teaching skill is important.
40. I respect my principal's authority.

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Table 6

Teacher/Student Relationship

Percentages Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
3	34.38	65.62	0.00	0.00	0.00
8	62.50	37.50	0.00	0.00	0.00
13	25.00	31.25	34.37	0.00	9.38
29	9.38	78.12	0.00	0.00	12.50

Responses Per Item

STATEMENT	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
3	11	21	0	0	0
8	20	12	0	0	0
13	8	10	11	0	3
29	3	25	0	0	4

3. I feel that I have a positive impact on my student's lives.
8. Teachers have an obligation to teach students how to become responsible and productive members of society.
13. My students feel that they can talk to me about anything.
29. Students want to learn about social issues.

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Table 7

Means for Social Issues: Ranking From
Most Attention (1.00) to Least Attention (10.00)

Category	Mean
Sex Education	2.73
Substance Abuse	3.40
The Environment	4.06
Ethics	4.33
Crime/Violence	4.46
World Hunger	6.66
Abortion Rights	7.66
Human Health/Disease	8.00
Censorship	8.00
War Technology	9.06

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Table 8

Means for Sources of Information on Social Issues: Ranking From
Primary Source (1.00) to Least Important Source (12.00)

Category	Mean
Newspapers	3.58
Television	4.00
Radio	6.66
Personal Experience	7.00
Weekly Magazines	7.33
Professional Journals	8.50
Books	8.91
Lectures/Inservice/Conventions	9.33
Friends & Acquaintances	9.41
Family	9.66
Church/Synagogue/Religious Association	11.25

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Table 9

Support by Administrators, Faculty/Staff, Student's Parents, Community

Percentages Per Item

	EXCEPTIONAL	MODERATE	LOW	NO SUPPORT
Administrators	6.25	75.00	9.37	9.37
Faculty/Staff	25.00	59.38	15.62	0.00
Peers	25.00	50.00	25.00	0.00
Student's Parents	0.00	40.60	50.00	9.4
Community	0.00	31.25	59.38	9.37

Responses Per Item

	EXCEPTIONAL	MODERATE	LOW	NO SUPPORT
Administrators	2	24	3	3
Faculty/Staff	8	19	5	0
Peers	8	16	8	0
Student's Parents	0	13	16	3
Community	0	10	19	3

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